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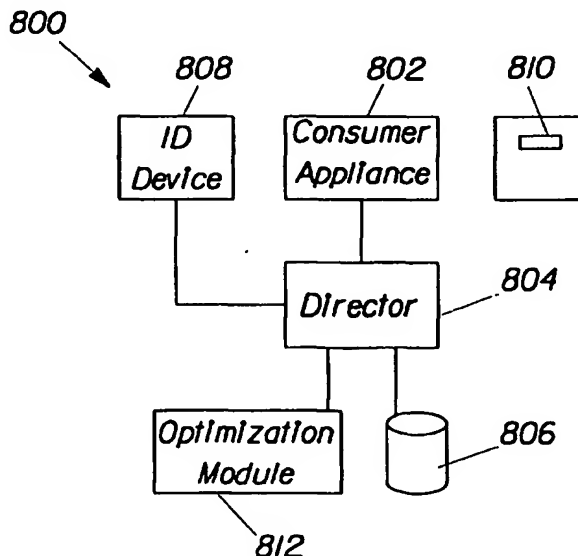
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(54) Title: **METHOD AND SYSTEM FOR OPTIMIZING PERFORMANCE OF CONSUMER APPLIANCES**



(57) Abstract: A system and method for optimizing performance of a consumer appliance, including: a consumer appliance; a work piece identifier; a director in communication with the consumer appliance; a data store in communication with the director; an identification device in communication with the director; and an optimization module in communication with the director, having executable instructions for determining optimized operating conditions of the consumer appliance. One exemplary embodiment is a method of optimizing processing conditions based on environmental conditions. The method comprises the steps of providing a consumer appliance having one or more sensors in communication with a director and sensing one or more environmental conditions from the sensors. The sensors might then communicate the environmental conditions to the director and to an optimization module in communication with the director. Finally, the optimization module might be configured to optimize the processing conditions based on the environmental conditions.

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## **METHOD AND SYSTEM FOR OPTIMIZING PERFORMANCE OF CONSUMER APPLIANCES**

### **TECHNICAL FIELD**

The present invention relates generally to optimizing the performance and convenience of consumer appliances, and more specifically to unique methods and systems for optimizing the ease of use and performance of consumer appliances such as a washing machine, a clothes dryer, an iron and an automated pet food dispenser.

### **BACKGROUND OF THE INVENTION**

The virtual explosion of technical advances in microelectronics, digital computers and software have changed and continue to change the face of modern society. In fact, these technological advances have become so important and pervasive that this explosion is sometimes referred to as "the information revolution." Through telephone lines, networks, satellite and other wireless communications and the like, information and resources are ever increasingly being accessed and shared.

Today, the majority of consumers are unnecessarily burdened with their laundry care and implementation and use of other consumer appliances. For example, the average consumer spends countless dollars and time to discover the most appropriate way to handle their laundry care needs. In some cases, a fortunate consumer will have a friend or parent that has gone through years of laundry care who can share their best methods for optimal cleaning and stain removal. However, this typical word of mouth information is subject to spotty availability, faulty memories and may have no scientific basis. In addition, reading articles in magazines or reading labels in the supermarket can be time consuming and inefficient to meet the consumers need. The consumer may spend unnecessary money trying to discover the best product and/or treatment process for their laundry.

Currently, tips and advice for laundry, dish washing and other cleaning tasks are not reliable or convenient. At least four typical sources of information exist. First, as mentioned, information on the best method of cleaning may be passed along by word of

mouth. Older children often ask advice of their parents. Adults typically ask trusted friends. A second source of cleaning information comes from product labels, magazines, newspapers and books. Written information from reliable resources is likely more scientific and not subject to memory loss. However, availability, depth of information and convenience are still issues. A more reliable and available source of information is the product label. Labels, however, are typically very small, and usually contain only essential information. The label directions are also generally designed to provide the broadest coverage of use. More details can be provided by articles, but they must be identified, read, cut out and organized by the consumer. Most wash areas can become wet or damp and are not conducive to convenient and long term maintenance of usable written materials. Books are likely kept in separate rooms and require familiarity with the subject context, in order to be used effectively. Furthermore, printed materials can quickly become dated, as new fabrics come to market. Finally, databases and the Internet are available for cleaning information. However, desktop computers typically needed to access such information usually are not located in washing areas due to the typical hostile environment (dust, moisture, cleaning products and the like).

In addition, it is the general nature of humans to learn through trial and error. Whether it is cooking, ironing or loading a dishwasher, consumers typically experiment to determine our favorite pattern of operation. Task regiments are typically remembered by consumers due to the repetition or because the instructions are written down. Usually the perceived importance or enjoyment of the task determines the details of the instructions. For example, a cook will make elaborate notes on a recipe that is well liked. On the other hand, chores like cleaning rarely have instructions, beyond a product label. Although consumers are not motivated to write down cleaning instructions, frustration can result when a newly discovered techniques is forgotten.

With the growing advance of the "information revolution", there is a need to improve the quality, quantity and efficiencies of methods and systems for optimizing the performance of consumer appliances.

### **SUMMARY OF THE INVENTION**

Accordingly, it is an object of the present invention to provide novel methods and

systems for optimizing useability and performance of consumer appliances. It is another and much more specific exemplary object of the invention to provide novel methods and systems for laundering identifiable items of clothing. These and additional objects and advantages are provided by the methods and systems of the present invention.

One embodiment of the present invention is a method of optimizing processing conditions based on environmental conditions and/or soiled article characteristics derived from one or more soiled articles to be laundered. The method comprises the steps of providing a consumer appliance having one or more sensors in communication with a director and sensing one or more environmental conditions and/or sensing one or more soiled article characteristics derived from one or more soiled articles present in the washing machine from the sensors. The sensors might then communicate the environmental conditions and/or soiled article characteristics to the director and to an optimization module in communication with the director. Finally, the optimization module might be configured to optimize the processing conditions based on the environmental conditions and/or the soiled article characteristics.

Yet another embodiment of the invention is a method of optimizing processing conditions based on environmental conditions. The method comprises the steps of providing a washing machine having a director having a communication link to a data store. The director might then retrieve one or more environmental conditions from the data store and provide the conditions to an optimization module in communication with the director. The optimization module might then optimize the processing conditions based on the environmental conditions.

Another aspect of the present invention is a method of collecting data. The method comprises the steps of providing an identification device, a work piece identifier and a director in communication with a consumer appliance and also providing a communications link between the director and an external data store. Next, each work piece item to be processed by the consumer appliance is identified and one or more processing factors corresponding to each of the identified work piece items might be retrieved. The director might then upload each identified work piece item and processing factor to the external data store, wherein the external data store is configured to collect data from at least one consumer appliance.

A further non-limiting embodiment of the present invention is a method of providing automatic reordering of laundering compositions. The method comprises the steps of providing an inventory module and a director in communication with a consumer appliance. The consumer appliance might also further comprise a detergent dispenser having an inventory of laundering compositions which might be monitored by a sensor in communication with the director. A communications link may be provided between the inventory module and an external data store configured to communicate with the inventory module, wherein the inventory module is configured to transmit an order of a quantity of laundering compositions to the external data store upon the sensor sensing that the inventory of laundering compositions has reached a predetermined level.

Yet another embodiment of the present invention is a method of optimizing the processing of one or more work piece items by a consumer appliance. The method comprises the steps of providing an identification device, a work piece identifier, a data store and a director in communication with a consumer appliance. Next, each work piece item to be processed by the consumer appliance might be identified and one or more processing factors corresponding to each of the identified work piece items might be retrieved from a data store. A user might then be allowed to set a desired conditioning and the system might optimize the processing conditions corresponding to the processing factors and the desired conditioning set by the user.

Still other objects, advantages and novel features of the present invention will become apparent to those skilled in the art from the following detailed description, which present, by way of illustration, various exemplary modes contemplated for carrying out the invention. As will be realized, the invention is capable of other different aspects and objects all without departing from the invention. Accordingly, the objects, advantages, aspects, drawings and descriptions are illustrative in nature and not restrictive.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

While the specification concludes with claims particularly pointing out and distinctly claiming the present invention, it is believed that the same will be understood from the following description taken in conjunction with the accompanying drawings in which:

Fig. 1 is a schematic illustration of a system for optimizing performance of a consumer appliance according to the present invention;

Fig. 2 is a schematic illustration of a system for laundering clothes according to the present invention;

Fig. 3 depicts an exemplary flowchart of a method of laundering clothes according to the present invention;

Fig. 4 depicts another exemplary flowchart of a method of laundering clothes according to the present invention;

Fig. 5 is a schematic illustration of a item of clothing to be laundered according to the present invention;

Fig. 6 is a plan view schematic illustration of a system for laundering clothes according to the present invention; and

Fig. 7 depicts a flowchart of a method of laundering clothes according to the present invention;

Fig. 8 is a schematic illustration of a system for drying clothes according to the present invention;

Fig. 9 is a schematic illustration of a system for ironing clothes according to the present invention;

Fig. 10 depicts a flowchart of a method of ironing clothes according to the present invention;

Fig. 11 is a schematic illustration of a system for pet feeding according to the present invention;

Fig. 12 depicts a flowchart of a method of feeding pets according to the present invention;

Fig. 13 is a schematic illustration of a system for treating items according to the present invention; and

Fig. 14 depicts a flowchart of a method of treating items according to the present invention.

#### **DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS**

Reference will now be made in detail to various embodiments of the invention,

various examples of which are illustrated in the accompanying drawings, wherein like numerals indicate corresponding elements throughout the views.

One aspect of the present invention, depicted in Fig. 1, is the system 800 for optimizing the processing of one or more work piece items by a consumer appliance, comprising: a consumer appliance 802; a director 804 in communication with the consumer appliance 802; a data store 806 in communication with the director 804; an identification device 808 in communication with the director 804; a work piece identifier 810; and an optimization module 812 in communication with the director 804, wherein the optimization module 812 comprises executable instructions for determining optimized process conditions of the consumer appliance 802.

One exemplary embodiment of the present invention is schematically illustrated in Fig. 2 which depicts a consumer appliance system 20 for laundering clothes in accordance with one aspect of the present invention. The system 20 is shown as preferably comprising a washing machine 22 as the exemplary consumer appliance, a director 25 in communication with the washing machine 22, a user interface 28, a data store 34, an identification device 40, and a optimization module 31 as will be further described herein. The optimization module 31, for example, would likely preferably comprise a set of executable instructions such as in the form of software, routines, programs, algorithms, code, logic and the like, which would, inter alia, facilitate the determination of optimized operating conditions of the washing machine.

In one embodiment, the optimization module 31 is preferably provided in communication, such as via a token ring, Ethernet, telephone modem connection, radio or microwave connection, parallel cables, serial cables, telephone lines, universal serial bus "USB", Firewire, Bluetooth, fiber optics, infrared "IR", radio frequency "RF" and the like, or combinations thereof with the data store 34 and the user interface 28. The optimization module may be integrated into the consumer appliance, or in an alternative embodiment be hosted or housed on a remote device. Remote devices may include other consumer appliances, a personal computer, or an external server located somewhere on the Internet.

In one embodiment, the user interface 28 might comprise a computer, a personal digital assistant (PDA), a device with wireless application protocol programs (WAP) such



as cell phone, auto computer or PDA, interactive TV, or an Internet appliance, or the like. User interface 28 allows the user to interact with the laundering system 20 and, as will be understood, can take any of a virtually unlimited number of alternative and/or audio, visual and/or other communicative forms. In an exemplary embodiment, the user interface 28 may comprise a computer system comprising a CPU, memory, a visual display device and an input means. Preferred input means comprise a keyboard or mouse or other means of input such as speech recognition and/or visual input utilizing a video camera. In the illustrated embodiment, the user interface 28 might comprise a computer connected to the Internet through a communication link 38 and running a web browser such as Internet Explorer from Microsoft Corp. or Netscape Navigator from Netscape Communications Corp.

A washing machine 22 of this example can be a standard washing machine known to one skilled in the art. In one embodiment of the present invention, the system 20 is integrated into the washing machine 22. In another embodiment, the system 20 is separate from the washing machine 22. It should be understood that in either embodiment, the system 20, generally speaking, comprises a plurality of components that might each comprise a set of executable instructions such as in the form of software, routines, programs, algorithms, code, logic and the like. Moreover, the system 20 might further comprise data stored in a data store that contains information relating to processing and otherwise cleaning or laundering clothing or other work items, where information is contemplated to mean data, executable instructions and the like. In a non-limiting embodiment of the present invention, it is contemplated that the information stored in a data store of the system 20 might be updated from time to time. In one embodiment, a consumer appliance might comprise a compact disk (CD) drive, such that a customer service representative of company associated with the consumer appliance might send a CD having updated information retrievable by the consumer appliance. In another embodiment, the consumer appliance might be in communication with an external data store that might be updated by a customer service representative of company associated with the consumer appliance. Any consumer appliance in communication with the data store might be configured to retrieve the updated information such as new executable instructions and/or data. It should be recognized that these are only two of

many possible ways to update and reconfigure the information associated with a consumer appliance.

The present invention contemplates identifying particular items of clothing. In one embodiment, the items of clothing to be laundered have an work piece identifier such as an identification tag or clothing identifier which comprises an identification means known to one skilled in the art. Such identification tags, for example, might comprise any combination of bar codes, radio frequency identification tags, data, chips, smart cards and the like. In particular, in an exemplary embodiment of the present invention, and as will be discussed in more detail, the items of clothing might comprise a Radio Frequency Identification (RF ID) tag that might allow the clothing to be recognized by an identification device 40. The identification device 40 might transmit the identification to a director 25 which might then search a data store, such as an external data store 36 for information relating to the identified clothing item. In an alternate embodiment, information relating to the particular item of clothing, such as the clothing's fabric composition may be stored directly on the tag and read by the identification device 40. In either embodiment, it should be recognized that additional information relating the item of clothing could be added to the item's identification. For example and as will be further discussed, a washing history record could be developed for each item of clothing and subsequently added to the tag or added at the external data store.

In one embodiment of the present invention, the identification device 40 comprises a bar code scanner. Various bar code scanners are known to one skilled in the art and include 1) pen type readers and laser scanners, 2) CCD readers and 3) camera based readers. Pen type readers include a light source and a photo diode that are placed next to each other in the tip of a pen or wand. To read a bar code, the user passes the tip of the pen across the bars and the photo diode measures the intensity of the light reflected back from the light source and generates a waveform that is used to measure the widths of the bars and spaces in the bar code. Dark bars in the bar code absorb light and white spaces reflect light so that the voltage waveform generated by the photo diode is an exact duplicate of the bar and space pattern in the bar code. This waveform is decoded by the scanner. Laser scanners work the same way as pen type readers except that they use a laser beam as the light source and typically employ either a reciprocating mirror or a

rotating prism to scan the laser beam back and forth across the bar code. As with the pen type reader, a photo diode is used to measure the intensity of the light reflected back from the bar code. In both pen readers and laser scanners, the light emitted by the reader is tuned to a specific frequency and the photo diode is designed to detect only this same frequency light. Pen type readers and laser scanners can be purchased with different resolutions to enable them to read bar codes of different sizes. The scanner resolution is measured by the size of the dot of light emitted by the reader. CCD (Charge Coupled Device) readers use an array of hundreds of tiny light sensors lined up in a row in the head of the reader. Each sensor can be thought of as a single photo diode that measures the intensity of the light immediately in front of it. Each individual light sensor in the CCD reader is extremely small and because there are hundreds of sensors lined up in a row, a voltage pattern identical to the pattern in a bar code is generated in the reader by sequentially measuring the voltages across each sensor in the row. The important difference between a CCD reader and a pen or laser scanner is that the CCD reader is measuring emitted ambient light from the bar code whereas pen or laser scanners are measuring reflected light of a specific frequency originating from the scanner itself. The newest type of bar code reader currently available are camera based readers that use a small video camera to capture an image of a bar code. The reader then uses sophisticated digital image processing techniques to decode the bar code. Video cameras use the same CCD technology as in a CCD bar code reader except that instead of having a single row of sensors, a video camera has hundreds of rows of sensors arranged in a two dimensional array so that they can generate an image.

In another embodiment of the present invention, the identification device 40 comprises a radio frequency scanning device. Radio Frequency Identification (RF ID) uses radio frequency communication to automatically identify, track and manage objects, people or animals. A low-frequency, passive, magnetically-coupled RF ID system is made up of two parts: a reader and a tag. The tags are typically attached to objects or animals that require a unique identification number. The tags include an electronic circuit (transponder) and tuned antenna-capacitor circuit. The tags are small sophisticated radio transmitters and receivers. They are powered by the RF field generated by the reader. Upon being powered up, the tag will continuously transmit, by damping the incoming RF

power field, its data. The RF ID reader has three main functions: energizing, demodulating and decoding. The reader, using a tuned antenna-capacitor circuit, emits a low-frequency radio wave field. This is used to power up the tags. The information sent by the tag must be demodulated. The encoded information is decoded by the reader's on-board micro-controller. This information can then be used by a controlling processor. In both the reader and the tag, the antenna can be shaped and sized in different ways. Because of the small size of the tag, it can be formed to fit almost any situation. Since there is no contact or viewing required, the RF ID system allows great freedom of movement and placement of the tag and reader become less of a critical issue.

There can be a number of ways to determine relevant appliance factors of the subject appliance, such as the exemplary washing machine. As an example, the laundering factors retrieved from the data store might be matched against one or more decision trees. A decision trees typically is a set of responses/traits/categories against which the laundering factors can be compared against. For example, a decision tree preferably comprises every combination of possible laundering factors. The laundering factors are then compared against the decision tree for a matching branch and the matching branch provides further instructions to be executed as a result of the match. Such decision trees would preferably comprise potential combinations of laundering factors which have been designed with the system's intended application in mind, so that appropriate optimized operating conditions can be established that pertain to the items of clothing to be laundered. Preferably, the decision trees are converted to mathematical algorithms which then process the decision tree comparisons or "decisions" electronically to ascertain the appropriate optimized operating conditions of the washing machine.

In order to update the optimization process to allow for modification or \_\_\_\_\_

incorporating user input such as feedback, frequency of laundering, number of launderings and laundering compositions utilized into the decision making process akin to artificial intelligence or "smart" logic. According to Haykin, S. (1994), *Neural Networks: A Comprehensive Foundation*, NY: Macmillan, p. 2, a neural network is a massively parallel distributed processor that has a natural propensity for storing experiential knowledge and making it available for use. It resembles the brain in two respects: 1) Knowledge is acquired by the network through a learning process; and 2) Interneuron connection strengths known as synaptic weights are used to store the knowledge. The neural network analyzes the data store 34 for trends, feedback data, laundering factor data and other additional data to develop and refine algorithms for decision making. In a preferred embodiment, a neural network would automatically make changes to the optimization module's 31 decision trees or algorithms based upon the growing base of laundering factors and user feedback data.

In another embodiment, the system 20 might further comprise a detergent dispenser 43 or similar consumer appliance action product or device (e.g., starch dispenser for an iron, vitamin dispenser for a pet feeder device, etc.) in communication with the optimization module 31. Such a detergent dispenser 43 might further include one or more laundry compositions to be dispensed into the washing machine. In another embodiment, the detergent dispenser is integrated into the washing machine 22, whereas in an alternative embodiment, the detergent dispenser 43 could be attached adjacent the washing machine. In this example, the action product or the detergent dispenser 43 is in communication with the optimization module and receives instructions for the appropriate time, amount, and choice of laundry composition to dispense into the washing machine. Various detergent dispensers are known to one skilled in the art. As will be understood, the detergent dispenser or other appliance action device of the present invention can be any detergent dispenser or the like known to or developed by one skilled in the art.

In yet another embodiment of the present invention, the system 20 further comprises a appliance action device (e.g. detergent dispenser) inventory module 45 in communication with the action device (detergent dispenser) 43 and the director 25. In this example, the detergent inventory module 45 comprises executable instructions for determining the amount and type of laundry compositions in the detergent dispenser 43.

This information can then be stored in the data store 34 and utilized by the optimization module 31, when the optimization module 31 determines optimum laundering conditions for the clothes by taking in account of exactly what laundering compositions are available for use.

As one skilled in the art will appreciate, the term detergent dispenser refers generically to a product dispenser containing various laundering compositions. In one embodiment of the invention, laundry compositions may comprise formulated compositions, such as, but not inclusively, detergents, such as Tide®, rinses such as Downy®, bleaches, fabric softeners such as Downy®, and the like. In another embodiment of the invention, laundry compositions may include the constituent ingredients, or, in other words, the individual ingredients of a formulated composition. An example of the constituent ingredients of a detergent such as Tide® may include, but are not limited to builders, surfactants, enzymes, brighteners, bleaching agents, conditioning agents, lubricants and any other ingredient.

In another embodiment, such device inventory module comprises executable instructions for sustaining an adequate quantity of products (e.g. laundering compositions) on-hand to ensure the consumer does not run out of laundering compositions while laundering clothes. For example, the detergent dispenser may include a level sensor or weight sensor to monitor the current inventory of laundering compositions in the detergent dispenser. In one embodiment of the present invention, the detergent inventory module will order electronically a replacement quantity of laundering compositions when the level of the laundering composition reaches a pre-determined level in the detergent dispenser. This supplier managed inventory allows the consumer to give up the hassle of monitoring the level of laundering compositions and provides a way for the consumer to ensure they have an adequate supply of the laundering compositions on hand. Alternatively, the detergent inventory module may send a message to the user informing the user that one of the laundering compositions in the detergent dispenser is at a pre-determined level. The message preferably is sent through E-mail or another messaging means known to one skilled in the art.

In a further embodiment of the present invention, the device inventory module comprises executable instructions for searching retailers product databases for a desired

product (e.g. laundering composition) at a desired price. For example, the consumer may use Tide® products for their laundering composition. The consumer through the user interface can activate the detergent inventory module to monitor Tide® product prices at local and/or on-line retailers. When a retailer is offering the Tide® products within the consumer's desired price range, the detergent inventory module will alert the consumer of the availability of Tide® products at the desired price. The consumer will then be provided instructions on where the Tide® products are available at the desired price, or preferably the detergent inventory module will comprise executable instructions to allow the consumer to purchase the Tide® products online and have the Tide® products delivered to the consumer's home. Similarly, the inventory module may be able to search wholesalers of constituent ingredients for a desired ingredient, and an inventory module may be capable of alerting consumers to the availability of a particular ingredient at a desired price.

In yet another non-limiting embodiment, it is contemplated that the system 15 might be configured to reorder laundry compositions based as least in part on the identity of clothing that is typically washed. A washer may identify via an RF ID tag or other known tag, and keep track of every item of clothing washed in a machine, and may use that information to determine which laundry compositions may need to be reordered. For example, if a particular washer, washes a large amount of dark clothes, the washer may be able to forecast when a particular detergent or constituent ingredient may run out and may either prompt a user that the detergent or ingredient needs to be reordered, or may search retailer/wholesaler databases for the desired product at a desired price.

In another embodiment, the system of the present invention might further comprise a communication link 38 and an external data store 36. The communication link provides access from the director to the external data store. The communication link is preferably a token ring, Ethernet, telephone modem connection, radio or microwave connection, parallel cables, serial cables, telephone lines, universal serial bus "USB", Firewire, Bluetooth, fiber optics, infrared "IR", radio frequency "RF" and the like, or combinations thereof. It is contemplated that an external data store might acquire and aggregate data from each consumer device in communication with the external data store. In particular, an individual washing machine 22 may store information relating to each

load and/or each item of clothing processed by the machine. This information may be uploaded to an external data store in communication with other consumer devices. In this way, an administrative user may be able to aggregate the data for research and development purposes, such as, for example, an administrative user may be able to identify new trends in fabrics or other relevant information. It is contemplated that the term uploaded means that a consumer appliance is capable of transmitting information, such as data relating to the characteristics of the clothing processed, to an external data base such that any person in communication with the external data base might have access to the data.

It should be recognized that data in the data store 22 is not limited to information uploaded by a washing machine, but rather might also include consumer feedback data from consumers with respect to difficulties they have experienced with current products and the consumer appliance. Additionally, it should be recognized that an administrative user may access the data store 36 and utilize the consumer's feedback to develop or improve the optimization module or products of the enterprise. This insight gained from the consumer may provide very beneficial information for product development and improvement of products and services of the enterprise. It can be contemplated as well, that an enterprise might make the data store, analysis of the data store, available to other entities. This might entail allowing such entities to have access to such data via the Internet, via printed reports, via interactive software on computers, periodic data subscription services and the like.

In yet another embodiment of the present invention, the external data store 36 comprises work piece processing properties and factors (e.g. clothing properties and laundering factors) corresponding to the work piece identifiers. For example, the work piece manufacturers (e.g. clothing manufacturers, pet food manufacturers) can access this data store to input the work piece identification information corresponding to products which the manufacturers sell to consumers. In the washing machine example, this data may include, color, fabric type, description of garment, date of manufacture, specific laundering care recommendations, image of the garment, and the like. Moreover, it should be understood that additional information relating to a work piece's properties and factors can be added so as to create a history of the work piece. For example, the number



of times a particular item has been washed, the kinds of stains removed from the item, and other relevant information may be stored relating to the work piece item. Upon obtaining the work piece (clothing) identifier from the identification device, the optimization module may search the external data store for work piece (laundry) properties of the work piece (garment) corresponding to the work piece identifier. This data is then preferably stored in a local memory store of the system.

In a further embodiment of the present invention, the system 20 might further comprise one or more sensors 53 in communication with the director. In the washing machine example, exemplary sensors may include one or more of the following sensors selected from the group consisting of: water temperature sensor, water pH sensor, water hardness sensor, speed sensor, vibration sensor, level sensor, electric load sensor, water flow sensor and water pressure sensor. For example, the water temperature sensor could be utilized to determine the optimal laundering conditions and to correctly set the water temperature to optimize the laundering of the clothes.

In an embodiment of the invention, it is contemplated that a consumer appliance might optimize processing conditions based on environmental conditions. For example, in an exemplary embodiment of the invention, it is contemplated that a washing machine system 20 might optimize laundering conditions based on initial water conditions. In particular, as known to one skilled in the art, the pH and hardness of the water utilized in the washing machine can greatly affect the performance of the laundry compositions when laundering clothes. By utilizing the pH and hardness water sensors, the optimization module can preferably account for the initial water conditions and make the appropriate changes in the laundering conditions to optimize the laundering of the clothes. In another embodiment, various water conditions such as pH and hardness might be retrieved from data stores on the Internet. For example, in some circumstances, local cities may publish certain characteristics regarding water quality, which may be retrieved by the washer so the optimization module can accommodate for water conditions. In this context, retrieved is contemplated to mean that a consumer appliance might be configured to download applicable information or data via a communication link such as over the Internet. It should be recognized that the characteristics of initial water conditions, whether retrieved from an external data store or obtained through sensors, might be stored

on a local data base to minimize time spent obtaining the information for the next cycle. Also, it is contemplated that a user might be provided with the characteristics of the initial water supply and allowed to modify and save the characteristics if desired.

In yet another embodiment of the invention, a consumer appliance might contain sensors that sense characteristics of a soiled article. It is contemplated that a sensor may sense the soiled characteristics directly from an article itself, or indirectly through water that contacts a soiled area. For example, in the washing machine application, a sensor maybe housed in a washing machine and the sensor maybe in communication with a director. The sensor may be integral with the machine or may be free-standing. For example, a sensor-containing device can be placed in the machine prior to or during use. The sensors can be in electronic communication with the direction, including but not limited to connection via wire or any electro-magnetic signal. The sensor may either directly or indirectly sense the characteristics of the soiled article and transmit the characteristics to a director in communication with an optimization module. An optimization module might then determine optimized processing conditions based on the communications from the sensor, and communicate the appropriate processing conditions to the director to ensure the soiled articles receive the appropriate wash treatment.

Alternatively the sensor may either directly or indirectly sense the characteristics of the soiled article and transmit to a user of the washing machine an optimal cleaning performance characteristic such that the user may take appropriate action prior to the commencement of the wash treatment to ensure that the soiled articles receive the appropriate wash treatment, preferably optimized cleaning of the soiled article. It is understood that a processing device may be needed to convert the soiled article characteristic into an optimal cleaning performance characteristic.

The sensors used in sensing a characteristic of a soiled article may be any suitable sensor known to those in the art. Examples of suitable sensors include, but are not limited to, pH sensors, conductivity sensors, water hardness sensors, turbidity sensors, temperature sensors, calcium ion sensors and oxidation-reduction potential sensors. Examples of such sensors are commercially available from companies such as Honeywell, Rosemount and Analytical Sensors Inc.

"Soiled article" as used herein means any article that is soiled or stained.

Examples of soiled articles include, but are not limited to, fabrics (i.e., garments, undergarments, socks, draperies, towels, linens, etc.), dishes, pots, pans, cookware, bakeware and tableware. In a preferred embodiment of the present invention, the soiled article comprises a soiled fabric article.

“Soiled article characteristic” and/or “characteristic of a soiled article” as used herein means any characteristic that is derived from a soiled article. Nonlimiting examples of soiled article characteristics include type of soil, composition of soil, type of article, amount of soil, pH of soil, conductivity created by soil, water hardness created by soil, temperature changes, and turbidity created by soil.

“Optimal cleaning performance characteristic” as used herein means one or more operating conditions by which the consumer appliance can be operated. In other words, one or more operating conditions that the user of the consumer appliance can incorporate into the consumer appliance prior to operating the consumer appliance such that optimal cleaning performance is achieved upon operation of the consumer appliance. The one or more operating conditions is in response to the soiled article characteristic derived from the soiled article. In one embodiment of the present invention, the optimal cleaning performance characteristic comprises a recommended dosage amount of an active ingredient to provide a desired cleaning benefit, such as a cleaning and/or laundry composition, to be used in the consumer appliance. In another embodiment of the present invention, the optimal cleaning performance characteristic comprises a recommended physical parameter for the operation of the consumer appliance, such as temperature, cycle time, agitation, pH, and the like.

The communication of the optimal cleaning performance characteristic to the user of the consumer appliance occurs at a time prior to the user inputting settings for operation of the consumer appliance and/or prior to the user adding an active ingredient to provide a desired cleaning benefit into the consumer appliance.

“Optimized cleaning” as used herein means achievement of cleaning results not attainable utilizing existing conventional wash methods. In other words, optimized cleaning means that a user of the consumer appliance wherein an optimal cleaning performance characteristic is communicated to the user and the user utilizes (incorporates into) the optimal cleaning performance characteristic in operating the

consumer appliance achieves better cleaning results as compared to a user who operates an identical consumer appliance without utilizing an optimal cleaning performance characteristic to operate the consumer appliance.

Other sensors may include a speed sensor, which can be utilized to ensure that delicate garments are not damaged in the washing machine by too fast of a spinning cycle or agitation cycle. Additionally, a vibration sensor could detect when the load of laundering items has become out of balance and preferably would alert the user to such a condition. In one embodiment, the optimization module in conjunction with the director would make changes to the laundering settings to minimize the vibrations of the washing machine. Another example of a sensor that can be utilized is a level sensor. The level sensor monitors the level of clothing and/or liquid in the washing machine to ensure that the washing machine is not overloaded with clothes. An electric load sensor would provide data to the director to determine when the laundering cycles change and when the laundering process is finished.

In another embodiment of the present invention, the system 20 might further comprise a reasoning module 48 in communication with the director 25. The reasoning module 48 preferably comprises executable instructions for providing information to a user regarding the optimized operating conditions. In the washing machine example, the reasoning module 48 will provide the user the reasons to believe the optimization module's determination of optimal conditions such as washing with warm water and a pre-rinse additive. In one embodiment, the user will be able to receive more information on any determination that the director in connection with the various modules has made. In another embodiment of the present invention, the reasoning module provides an explanation on why a potential processing conflict exists. It is believed that consumers are more likely to utilize and trust the decision making process of the present invention if the users are provided with an explanation or reasons to believe the decisions made by the system.

In yet another embodiment of the present invention, the system 20 might further comprise a processing history module 50 in communication with the director 25. The processing history module 50, preferably provides executable instructions for collecting and maintaining a processing history on action on the work piece items by the consumer

appliance. In the washing machine example, the history module might monitor all stains that have occurred on the garment in the past or monitor the number of times a garment has been laundered. This information can be later retrieved by a consumer to determine how well the work piece is being processed by the consumer appliance (e.g. how a clothing garment has withstood multiple launderings). In one embodiment, an administrative user can access the history module to better develop and improve products and services of the enterprise.

Another aspect of the present invention is the method of optimizing the processing of one or more work piece items by a consumer appliance. In one exemplary embodiment, the method comprises the steps of: providing an identification device, a work piece identifier, a data store and a director in communication with a consumer appliance; identifying each work piece item to be processed by the consumer appliance; retrieving one or more processing factors corresponding to each of the identified work piece items from a data store; determining potential processing conflicts corresponding to the processing factors of each of the identified work piece items; notifying a user of any potential processing conflicts; determining optimized processing conditions corresponding to the processing factors; and prompting the user to confirm the optimized processing factors.

An exemplary embodiment of the method of optimizing the processing of one or more work piece items by a consumer appliance is depicted in Fig. 3 for the a washing machine example for laundering multiple items of clothing. In this example, the method might comprise the steps of: providing a director in communication with a washing machine, a user interface, an optimization module and a data store (step 60); identifying each of the items to be laundered (step 61); retrieving one or more cleaning factors corresponding to each of the items of clothing from the data store (step 64); determining potential laundering conflicts corresponding to the cleaning factors of each of the items of clothing (step 66); alerting a user of the potential laundering conflicts (step 68); determining optimal laundering conditions corresponding to the cleaning factors of each of the items of clothing (step 70); informing the user of the optimal laundering conditions (step 72); prompting the user to provide feed back data on the laundering of the items of clothing (step 84); and receiving from the user feed back data relating to the laundering

process (step 86).

In one embodiment of the present invention, the step of identifying each work piece item may comprise manually entering the work piece information into the user interface, or preferably comprises reading a tag with an identification system such as bar code or RF ID tags. In another embodiment, the processing factors may be manually entered. In the washing machine example, the manual option might comprise the user entering the garment type, color, fabric type, manufacturer, care instructions, and the like or combinations thereof. In the washing machine. For example, the user may enter through the user interface, that the work piece has the following processing factors (e.g. white in color, 100% cotton, men's underwear). This data will then be utilized in at least part by the director to determine if there are any potential processing conflicts and to determine the optimal processing conditions. Preferably, the identification step is automatic and comprises scanning a work piece identifier (e.g. bar code) or receiving the identifying information from the work piece identifier (e.g. RF ID tag). The work piece identifier (e.g. RF ID tag, bar code) might comprise a serial number that is unique to the work piece item (clothing garment). This serial number can be utilized to retrieve processing (laundrying) factors that need to be considered for the work piece (item of clothing). In the washing machine example, such factors include: fabric type, color, restrictions on laundrying, drying factors, and the like.

Once the processing (laundrying) factors have been retrieved, the director and the optimization module determine if any potential processing conflicts exist. For example, in the washing machine exemplary embodiment, the user may have accidentally combined a item of clothing that is made from silk and "dry clean" only with a load of denim blue jeans. The "dry clean" only garment will most likely be ruined if laundryed with the blue jeans. The optimization module utilizing the serial number for each of the items can retrieve the processing factors corresponding to each of the items. The processing factors are then preferably analyzed against a decision tree or algorithm to determine if any potential conflicts exist. If a processing (laundrying) conflict exists, the director can alert the user of the conflict. This alert may comprise an audio alarm, voice, visual alarm, displaying a message, and the like or combinations thereof. The user may have the ability to override the processing conflict and have the alert canceled. In one

embodiment, if a user overrides the processing (laundrying) conflict, the user is asked whether to repeat this alarm in the future for these work piece items (e.g. items of clothing) or to ignore this potential conflict in the future. The user's input can then be stored in the data store and utilized in subsequent operations of the consumer appliance.

In one embodiment, the user acknowledges the alert of the processing conflict and removes the work piece(s) resulting in the processing conflict. In another embodiment of the present invention, the optimization module may determine multiple processing conflicts exist. In this embodiment, the optimization module might provide the user detailed instructions on which work piece items are generating the processing conflicts and how to resolve the processing conflicts.

In another embodiment of the present invention, the consumer appliance comprises a user interface. For example, the user interface may comprise a visual display such as a touch screen or an audio interaction. The world wide web might be accessed through the touch screen using a web browser known to one skilled in the art. Web access may be provided through a communication link such as a token ring, Ethernet, telephone modem connection, radio or microwave connection, parallel cables, serial cables, telephone lines, universal serial bus "USB", Firewire, Bluetooth, fiber optics, infrared "IR", radio frequency "RF" and the like, or combinations thereof. In one embodiment, a slow Internet connection could be compensated for by providing a memory cache that is updated during idle periods.

In one embodiment, the user interface (touch screen) will provide additional information to the user. For example in the washing machine example, suggestions may be presented on optimized laundrying conditions based on the state of the machine and laundrying factors corresponding to the item of clothes to be laundryed. Laundrying factors can be acquired by identifying the items of clothing and subsequently retrieving corresponding laundrying factors from a data store. In a further embodiment, the state of the processing of the work piece by the consumer appliance can be visually represented on the user interface (touch screen). When the state changes, a relevant help icon might appear. In the washing machine example, if a white cotton blouse is added to the washing machine, a RF ID or other identification technology may discover the garment and display its image on the touch screen. The image may be retrieved from the data store

along with other processing (laundering) factors corresponding to the work piece (item of clothing). In the washing machine example, simple icons might be displayed to the user offering topics such as "Cleaning cotton", "Bleaching whites" or "Removing stains from cotton". The topics could be retrieved from the Internet or from the local data store. If the user selects one of the icons corresponding to the topics, the topic will be delivered to the user. Additionally, newsletters could be presented to the consumer presenting timely or recent discoveries or information to the consumer. On a periodic basis, the user interface may offer topics of general interest including new processing (washing) methods, new products and special offers. In another embodiment of the present invention, an icon will always be present on the user interface to directly connect the user to a customer service person of the company. If the Internet connection is slow, an e-mail may be sent or a request for a phone call may be made. In one embodiment, the system further comprises an audio system. A question and answer conversation could be conducted over streaming audio and/or video. With the addition of a video system, a company customer service would be able to more fully appreciate the processing issue. In an exemplary embodiment, a user may be able to video conference with an expert service representative of a customer service through a user interface of the consumer appliance. Moreover, because the consumer appliance has a communication link to an external database, the expert representative may be able to download information relating to machine to aid the servicing request.

In a further embodiment, user feedback data may be solicited from the consumers. In an exemplary embodiment, the feedback might be collected almost immediately following the solicitation of the advice or almost immediately following a users follow through of the advice. In this way, a customer service representative could monitor consumer satisfaction. Preferably, all suggestions are analyzed by customer service representatives and the information is stored in the data store.

Another exemplary embodiment of the present invention, illustrated in Fig. 4, is the method of laundering an item of clothing. The method comprises the steps of: providing a director in communication with a washing machine, an identification device, a user interface and a data store (step 60); capturing a clothing identifier from the item of clothing to be laundered (step 62); retrieving clothing properties corresponding to the



clothing identifier from the data store (step 64); determining potential laundering conflicts from the retrieved laundering properties (step 66); notifying a user of any determined laundering conflicts (step 68); determining optimized laundering conditions from the retrieved clothing properties (step 70); notifying the user of the optimized laundering conditions (step 72); prompting the user to accept or modify the optimized laundering conditions (step 74); receiving from the user modification input relating to the optimized laundering conditions (step 76); determining if any changes or rejections of the recommendations were input by the consumer (step 78); storing the user modification input in the data store for later retrieval; laundering the clothes (step 82); prompting the user, after the laundering of the clothes is complete to enter feedback data (step 84); receiving the feedback data from the user (step 86); and storing the feedback data in the data store (step 88).

In one embodiment, the method further comprises the steps of prompting the user to input laundering options corresponding to the item of clothing (step 90); receiving the laundering options (step 92) and accounting for the laundering options when determining the optimized laundering conditions. In another embodiment, the method further comprises the step of retrieving from the data store instructions corresponding to the laundering options and notifying the user of the instructions for the selected laundering options. Preferably, the user is notified by displaying the laundering option instructions utilizing the user interface. In another embodiment, the laundering option instructions are delivered by a voice output to the consumer. In the washing machine example, the washing machine will prompt the consumer to identify the stains and soils present on the laundry items. For instance, the consumer can specify the soccer uniform had mud and grass stains. In one embodiment, the consumer selects an icon on the user interface representing a laundry item that was placed into the washer machine. In an alternative embodiment, the consumer selects a stain or soil type representative of the mean (average) of the entire set of laundry items placed into the washing machine. The consumer can then select each laundry article on the user interface and assign stain and soil characteristics with the user interface. In one embodiment, the user interface may automatically display descriptive icons and words describing the stains and soils immediately after the clothing article scanning. A list of stain families, but not inclusive

comprises: food stains, beverage stains, oil and grease stains, organic stains, and inorganic stains.

For example, an item of clothing, such as a shirt 55 may have an ID tag 56 sewn into the shirt 55 as is depicted in Fig. 5. When the shirt 55 is ready to be laundered, it is placed in the opening 23 of the washing machine 22 as depicted in Fig. 6. Preferably, the ID device 40 is located adjacent the opening 23 on the washing machine 22. When the item of clothing is passed by the ID device 23, the radio frequency being emitted from the ID device 23 activates the ID tag 56 sewn into the shirt 55. The ID tag 56 transmits a serial number to the ID device 23. The ID device 23 then passes the serial number on to the director of the present invention. The director activates the optimization module 31. The optimization module 31 executes a request to the data store for laundering factors of the item corresponding to the serial number.

In yet another embodiment of the invention, the washing machine may allow a user to set a desired conditioning outcome rather than the traditional approach of setting a particular wash cycle. For example, a washing machine may allow a user to set a desired conditioning such as, but not limited to, low wrinkle, crisp, extra white, or mountain fresh (or other perfume). In this embodiment, an optimization module may optimize the desired washing conditions not only with respect to processing factors associated with each item of clothing being washed, but also with respect to the desired conditioning set by the user. For example, a user may select a desired conditioning of low wrinkle clothing. The user may then proceed to load items of clothing in the washing machine, with each clothing item being identified by an identification device. The washing machine may then retrieve one or more processing factors corresponding to each of the clothing items, and the washing machine may optimize the washing conditions corresponding to both the processing factors and the desired conditioning set by the user.

In one embodiment of the present invention, a local data store is first accessed to determine if data corresponding to work piece identifier exists in the local data store. By local data store, we mean a data store located in the household or vicinity of the washing machine. For example, the data store may be attached to the consumer appliance (e.g. washing machine, dryer, iron) a home computer, or the network of the household. If no corresponding data is found in the local data store, a request is executed by the director to

search an external data store attached through the communication link. In one embodiment of the present invention, the data store is located on the Internet and contains processing (laundering) factors relating to a plurality of work piece (clothing) items. This data store may be capable of being maintained and updated by manufacturers and retailers of the work piece (clothing) items.

The external data store can be accessed and searched for data corresponding to the work piece identifier. If corresponding data is found, the data can be downloaded to the director and stored in the local data store for later retrieval. If no corresponding data is found in the data store, the user is preferably given the option to search another data store or to enter known processing (laundering) factors for the work piece item. This information is then saved in the data store and can preferably be retrieved by all users on subsequent searches corresponding to that work piece identifier (serial number). In another embodiment, the inputted data from the consumer may be sent to an administrative user first to be reviewed before being stored in the data store.

Once the work piece item (clothing) has been identified and corresponding processing (laundering) factors retrieved, the system is ready to process the next work piece item (item of clothing). In one embodiment, the director stores every identifier (ID tag, serial number) as the item is processed by the consumer appliance. After all items have been entered, the director initiates the optimization module to retrieve the corresponding processing (laundering) factors.

In a further embodiment of the present invention, the user is prompted through a user interface to indicate when all items have been entered into the consumer appliance. Upon receiving the input from the user that all items are entered in the consumer appliance, the director might activate the optimization module. The optimization module can determine by analyzing and comparing the processing factors corresponding to the work piece items if there are any processing conflicts. If the optimization module determines any processing conflicts, an alert is sent to the user alerting him/her of the conflict. Preferably, the alert comprises an audio or visual alert or alarm. In one embodiment, the alert might display a list of conflicting items or comprise a spoken voice which indicates which item(s) are generating the processing conflict. The user might be requested to remove the conflicting item(s) or override the alert. If the user chooses to

remove the conflicting items, the user may indicate through the user interface when the conflicting items have been removed. The director then preferably re-scans the identified work piece identifiers (ID tags) to ensure that no processing conflict remains.

In yet another embodiment, the method further comprises the step of determining potential processing additions and deletions to optimize the performance of the consumer appliance. For example in the washing machine example, the user may have inserted a load of clothing in the washing machine which contains mainly white cotton garments and a red sock. While, the red sock may not be a potential laundering conflict since the clothes can safely be laundered together on a cold setting with no bleach for example, the laundering of the white cotton garments could be optimized by the removal of the red sock which then would allow a higher water temperature and the inclusion of bleach into the laundering method. An example of a potential laundering addition may occur when there is extra room remaining in the washer for additional clothes. The director might access the data store and notify the user of other work pieces (garments) that have corresponding entries in the data store that the user has previously processed (e.g. laundered) that could be added to consumer appliance if the additional item needs processing (e.g. laundered).

An exemplary method of the present invention is depicted in Fig. 7. A user loads a garment into the washing machine (step 120). Utilizing RF ID technology with passive and proximity scanning, the garment type is identified (step 124). The user interface prompts the user on whether there are any more garments to be laundered (step 128). If more garments are to be laundered the above steps are repeated. If no more garments are to be added to the washing machine, the consumer is given the opportunity to assign stain and soil levels to each individual garment (step 132). This stain and soil data is then sent to an external server (step 136) where the optimized washing and treatment recommendations are determined. The system then determines whether all the garments are compatible (step 140). If one or more garments is determined not to be compatible, the consumer is warned of the incompatible garment (step 144). The consumer then removes the garment or overrides the warning (step 146). The optimized laundering conditions are then determined by analyzing the garments and stain information (step 150). A list of recommendations is then presented to the consumer (step 154). These

recommendations preferably include reasons to believe the recommendations. The consumer is then prompted to accept or reject the recommendations (step 158). If the consumer rejects the recommendations, the consumer is prompted to enter reasons for rejection (step 160). The reasons for rejection are then stored for future reference for the consumer (step 162). If the consumer accepts the recommendations, the consumer is prompted to perform the stain pre-treatments (step 164). After the pre-treatment, the consumer will start the washing machine (step 166). The washing machine settings and product dosings are set automatically by the system of the present invention (step 170). The washing machine then launders the items of clothing (step 172). After the laundering is complete, the consumer is asked to rate the laundering results (step 174). The laundering results are then stored in the data store and later analyzed to improve the decision making process of the present invention (step 176).

One exemplary aspect of the present invention is a system 200 for drying clothes, as depicted in Fig. 8. The system 200 comprises a clothes dryer 202; a director 204 in communication with the clothes dryer 202; a data store 206 in communication with the director 204; an identification device 208 in communication with the director 204; a user interface 210; a clothing identifier 212 and an optimization module 214 in communication with the director 204. The optimization module 214 comprises executable instructions for determining optimized operating conditions for the clothes dryer 202.

Another exemplary aspect of the present invention is a method of drying one or more clothing items. The method comprises the steps of: providing a director in communication with a clothes dryer, a user interface, an optimization module and a data store; identifying each of the items to be dried; retrieving one or more drying factors corresponding to each of the items of clothing from the data store; determining potential drying conflicts corresponding to the drying factors of each of the items of clothing; alerting a user of the potential drying conflicts; determining optimal drying conditions corresponding to the drying factors of each of the items of clothing; informing the user of the optimal drying conditions; prompting the user to provide feed back data on the drying of the items of clothing; and receiving from the user feed back data relating to the drying process.

Yet another exemplary aspect of the present invention, depicted in Fig. 9, is a

system 300 for ironing clothes. The system 300 comprises an iron 302; a director 304 in communication with the iron 302 ; a data store 306 in communication with the director 304; an identification device 308 in communication with the director 304; a clothing identifier 310; and an optimization module 312 in communication with the director 304. The optimization module 312 comprises executable instructions for determining optimized operating conditions of the iron. In one embodiment of the present invention, the system 300 further comprises a user interface 314.

An exemplary aspect of the present invention, depicted in Fig. 10, is a method of ironing of clothing. The method comprises the steps of: placing the garment on an ironing board (step 320); identifying the item to be ironed (step 330); entering current garment conditions (e.g. wrinkles, odors, desired level of stiffness) (step 332); inputting desired conditioning of the garment (e.g. de-wrinkle, refresh, crispness, soften, odor removal) (step 336); transmitting one or more conditioning options corresponding to the item of clothing to the director (step 338); determining optimal ironing conditions corresponding to the ironing factors of the item of clothing (step 340); informing the user of the optimal ironing conditions (step 344); prompting the user to accept or reject the recommendations (step 346); recording rejections from user, if user rejects recommendations (step 350); setting the iron with the determined operating conditions (step 354); consumer performs the ironing (step 356); prompting the user to determine whether instructions were followed (step 358) prompting the user to provide feed back data on the ironing of the item of clothing (step 360); and receiving/storing from the user feed back data relating to the ironing process (step 362).

Another exemplary aspect of the present invention, depicted in Fig. 11, is the system 400 for feeding animals comprising an feeding device 402; a director 404 in communication with the feeding device 402; a data store 406 in communication with the director 404; an identification device 408 in communication with the director 404; a pet identifier 410; and a feeding module 412 in communication with the director 404, wherein the feeding module 412 comprises executable instructions for determining the appropriate feeding parameters of the feeding device 402.

A further exemplary aspect of the present invention is a method of feeding animals with an automated pet feeder, as depicted in Fig. 12. The method might

comprises the steps of: identifying a pet in proximity of the pet bowl (450); determining if current bowl belongs to identified pet (step 455); retrieving feeding factors corresponding to the pet from the data store (step 460); determining if the bowl is empty (step 464); if the bowl is not empty; the pet will have to eat the food still in the bowl (step 468); if the bowl is empty, determining feeding schedule for the pet corresponding to the feeding factors (step 470); rejecting the feeding attempt by the pet, if the feeding schedule does not permit a feeding at this time (step 474); dispensing appropriate pet food to the automated pet feeder if the feeding schedule corresponds to a feeding at this time (step 480); and recording a history of feedings in the data store corresponding to the identified pet (step 484).

Another exemplary aspect of the present invention, depicted in Fig. 13, is the system 500 for pre-treating an item of clothing comprising a pretreatment device 502; a director 504 in communication with the pretreatment device 502; a data store 506 in communication with the director 504; an identification device 508 in communication with the director 504; a clothing identifier 510; and a pretreatment module 512 in communication with the director 504, wherein the pretreatment module 512 comprises executable instructions for determining operating parameters of the pretreatment device 502.

Yet another exemplary aspect of the present invention, depicted in Fig. 14, is a method of pre-treating clothing. The method might comprise the steps of: identifying the item to be pre-treated (step 550); inputting one or more desired conditioning factors (step 555); transmitting one or more conditioning factors corresponding to the item of clothing to the director (step 560); determining optimal pre-treatment conditions corresponding to the conditioning factors of the item of clothing (step 564); informing the user of the optimal pre-treatment conditions (step 566); prompting the user to accept or reject the recommendations (step 570); recording rejections from user, if user rejects recommendations (step 572); setting the pre-treatment device with the determined operating conditions (step 576); consumer performs the treating (step 580); prompting the user to determine whether instructions were followed (step 582); prompting the user to provide feed back data on the treatment of the item (step 586); and receiving/storing from the user feed back data relating to the treatment process (step 590).

The examples are specific embodiments set forth herein are for illustrative purposes only and are not intended to limit the scope of the methods and fabric of the invention. Additional methods and fabrics within the scope of the claimed invention will be apparent to one of ordinary skill in the art in view of the teachings set forth herein.



We claim:

1. A method of optimizing processing conditions based on environmental conditions comprising the steps of:

providing a consumer appliance having one or more sensors in communication with a director;

sensing one or more environmental conditions and/or one or more soiled article characteristics from the sensors;

communicating the environmental conditions and/or soiled article characteristics to the director; and

providing an optimization module in communication with the director, the optimization module configured to optimize processing conditions corresponding to the environmental conditions and/or soiled article characteristics.

2. The method of optimizing processing conditions according to claim 1, wherein the consumer appliance comprises a washing machine and the environmental conditions comprise water conditions.

3. The method of optimizing processing conditions according to claim 1, wherein the one or more sensor devices is selected from the group comprising a water pH sensor, water hardness sensor, conductivity sensor, turbidity sensor, temperature sensor, calcium ion sensor, and oxidation-reduction potential sensor.

4. The method of optimizing processing conditions according to claim 1, wherein the director is provided in communication with a data store through a communication link, the director being configured to retrieve one or more cleaning factors from the data store and communicate the data factors to the optimization module, the optimization module being configured to optimize the processing conditions based on the cleaning factors.

5. The method of optimizing processing conditions according to claim 1,

further comprising the step of providing a detergent dispenser comprising an inventory of laundering compositions in communication with the director and the optimization module, the optimization module being configured to optimize the processing conditions based on the laundering compositions.

6. The method of optimizing laundering conditions according to claim 5, wherein the laundering compositions are selected from the group comprising formulated compositions and constituent ingredients.

7. A method of optimizing processing conditions based on environmental conditions comprising the steps of:

providing a consumer appliance comprising a director having a communication link to a data store;

retrieving one or more environmental conditions from the data store; and

providing an optimization module in communication with the director, the optimization module configured to optimize processing conditions based on the environmental conditions.

8. The method of optimizing processing conditions according to claim 7, wherein the consumer appliance comprises a washing machine and the environmental conditions comprise water conditions.

9. The method of optimizing processing conditions according to claim 7, wherein said communication link provides access to an external data store.

10. The method of optimizing processing conditions according to claim 7, further comprising the step of providing a detergent dispenser comprising an inventory of laundering compositions in communication with the director and the optimization module; the optimization module being configured to optimize the processing conditions based on the laundering compositions.

11. The method of optimizing laundering conditions according to claim 10, wherein the laundering compositions are selected from the group comprising formulated compositions and constituent ingredients.

12. The method of optimizing laundering conditions according to claim 7, wherein the consumer appliance comprises one or more sensors in communication with the director, the sensors configured to sense one or more soiled article characteristics and communicate the soiled article characteristics to the director, the optimization module in communication with the director being configured to optimize processing conditions based on the soiled article characteristics.

13. A method of collecting data comprising the steps of:  
providing an identification device, a work piece identifier and a director in communication with a consumer appliance;  
providing a communications link between the director and an external data store;  
identifying each work piece item to be processed by the consumer appliance;  
retrieving one or more processing factors corresponding to each of the identified work piece items; and  
uploading each identified work piece item and processing factor to the external data store, wherein the external data store is configured to collect data from at least one consumer appliance.

14. The method of collecting data according the claim 13, wherein the consumer appliance further comprises a washing machine and wherein each work piece item comprises an article of clothing.

15. The method of collecting data according the claim 13, wherein the collected data comprises an aggregated data base configured to allow analysis thereof.

16. A method of providing automatic reordering of laundering compositions comprising the steps of:

providing an inventory module and a director in communication with a consumer appliance;

the consumer appliance further comprising a detergent dispenser having an inventory of laundering compositions;

providing a sensor in communication with the director and configured to monitor the inventory; and

providing a communications link between the inventory module and an external data store, wherein the inventory module is configured to transmit an order of a quantity of laundering compositions to the external data store upon the sensor sensing that the inventory of laundering compositions has reached a predetermined level.

17. The method of providing automatic reordering of laundering compositions of claim 16, wherein the sensor is selected from the group comprising a level sensor and a weight sensor.

18. The method of providing automatic reordering of laundering compositions of claim 16, wherein the laundering compositions are selected from the group comprising formulated detergents and constituent ingredients.

19. A method of optimizing the processing of one or more work piece items by a consumer appliance, comprising the steps of:

providing an identification device, a work piece identifier, a data store and a director in communication with a consumer appliance;

identifying each work piece item to be processed by the consumer appliance;

retrieving one or more processing factors corresponding to each of the identified work piece items from a data store;

allowing a user to set a desired conditioning outcome; and

optimizing processing conditions corresponding to the processing factors and the desired conditioning outcome set by the user.

20. The method of optimizing the processing of one or more work piece items

of claim 19, wherein the desired conditioning outcome is selected from the group comprising low wrinkle, crisp, extra white and mountain fresh.

21. The method of optimizing the processing of one or more work piece items of claim 19, wherein the consumer appliance further comprises a washing machine.

22. The method of optimizing the processing of one or more work piece items of claim 19, wherein the consumer appliance comprises a user interface in communication with a customer service representative via a communication link.

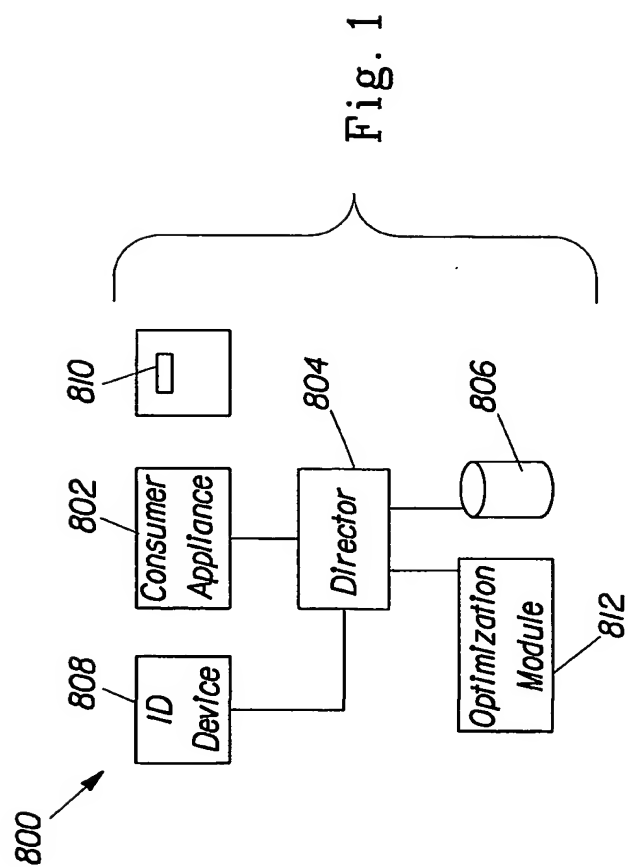
23. The method of optimizing the processing of one or more work piece items of claim 22, wherein the communication link comprises a video system.

24. The method of optimizing the processing of one or more work piece items of claim 19, wherein the consumer appliance further comprises a compact disk reader configured to retrieve updated information from a compact disk

25. The method of optimizing the processing of one or more work piece items of claim 19, wherein the consumer appliance is provided in communication with an external data store, wherein the consumer appliance is configured to retrieve updated information from the external data store.

26. The method of optimizing the processing of one or more work piece items of claim 19, wherein the consumer appliance comprises one or more sensors in communication with the director, the sensors configured to sense one or more soiled article characteristics and communicate the soiled article characteristics to the director, the optimization module in communication with the director being configured to optimize processing conditions based on the soiled article characteristics.

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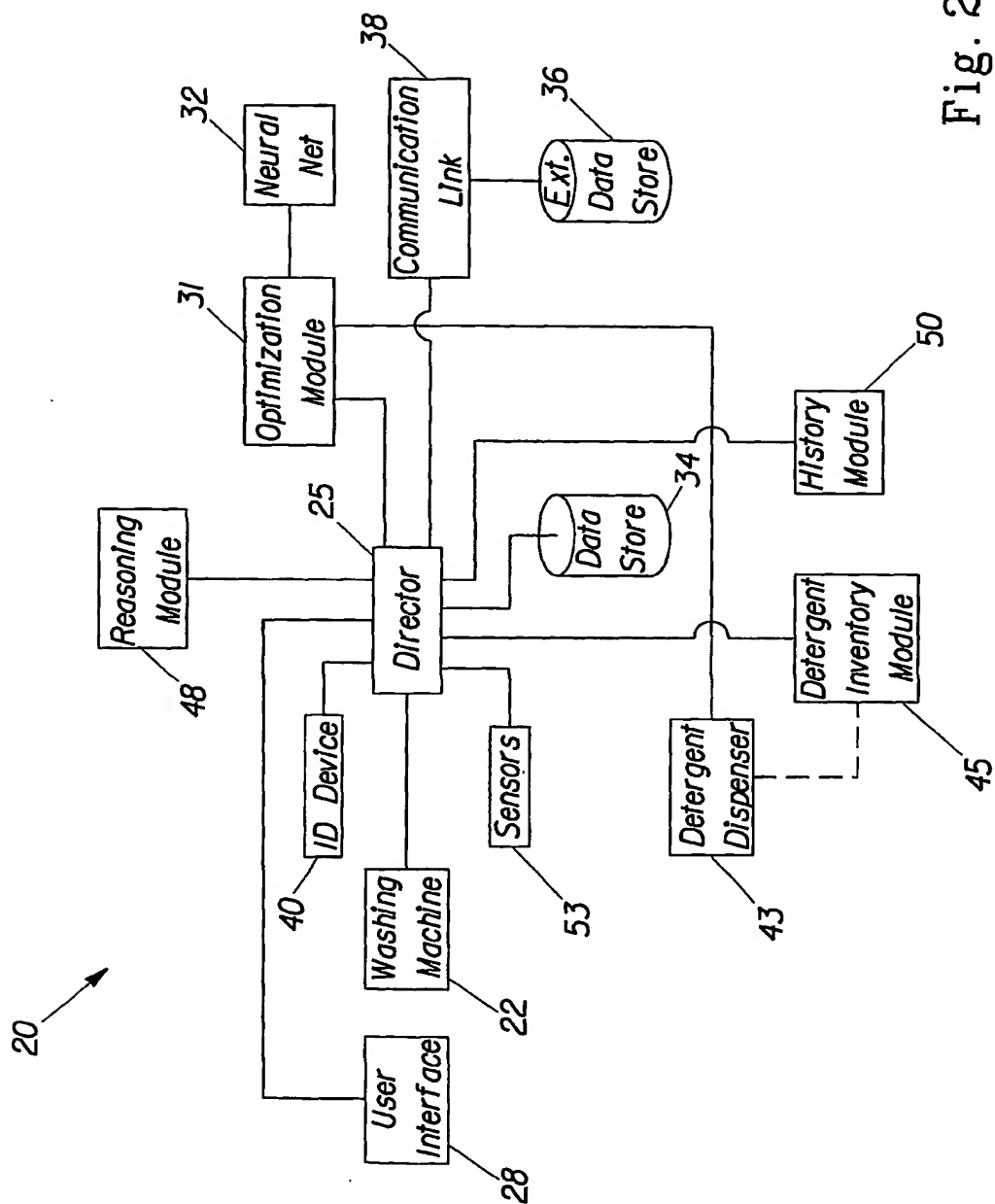


Fig. 2

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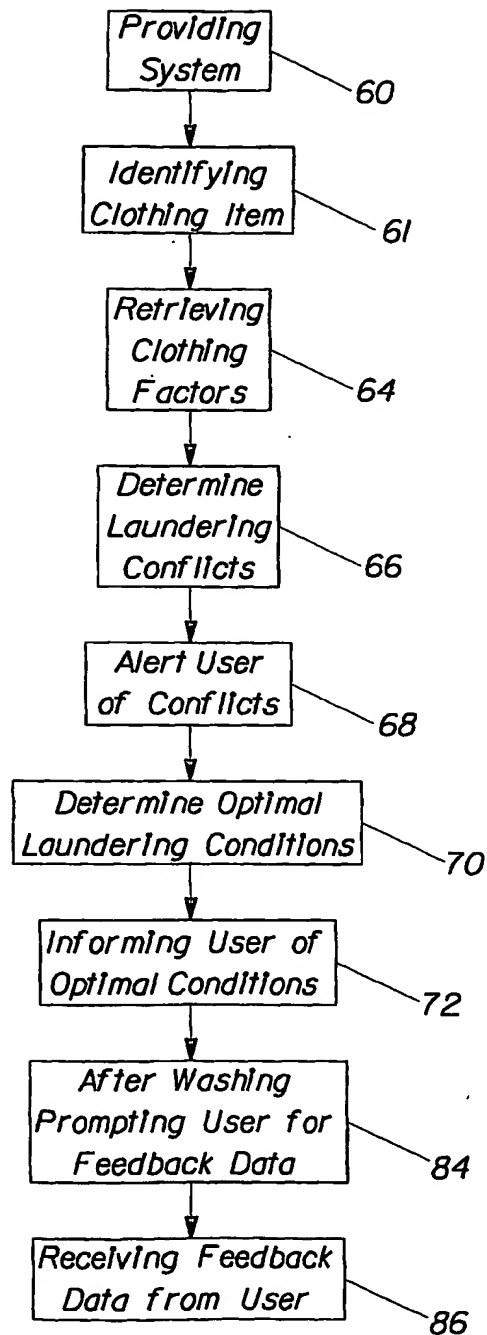


Fig. 3



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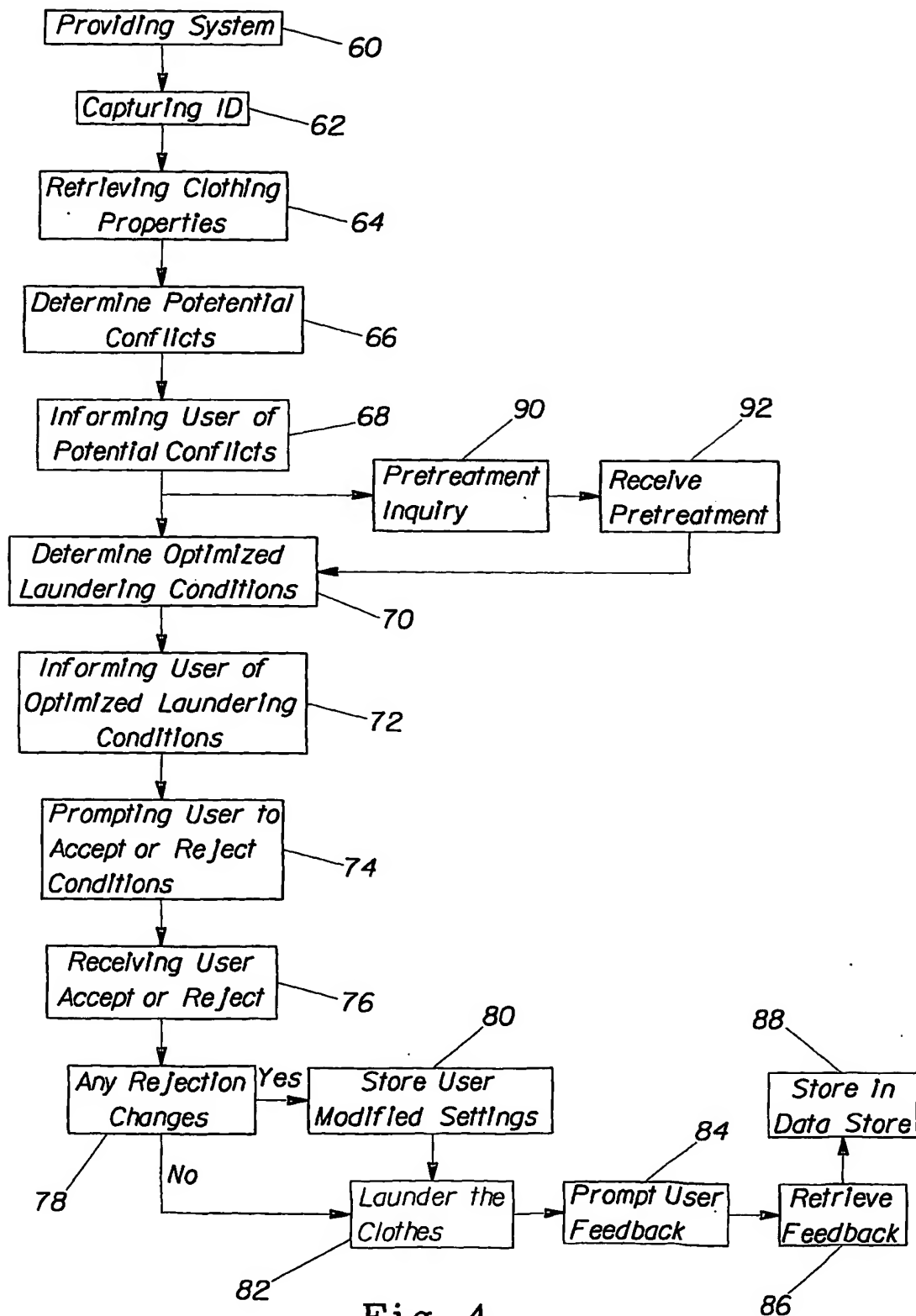


Fig. 4

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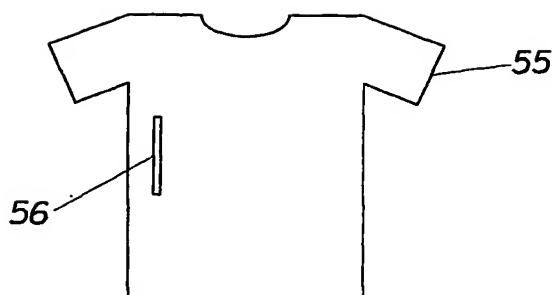


Fig. 5

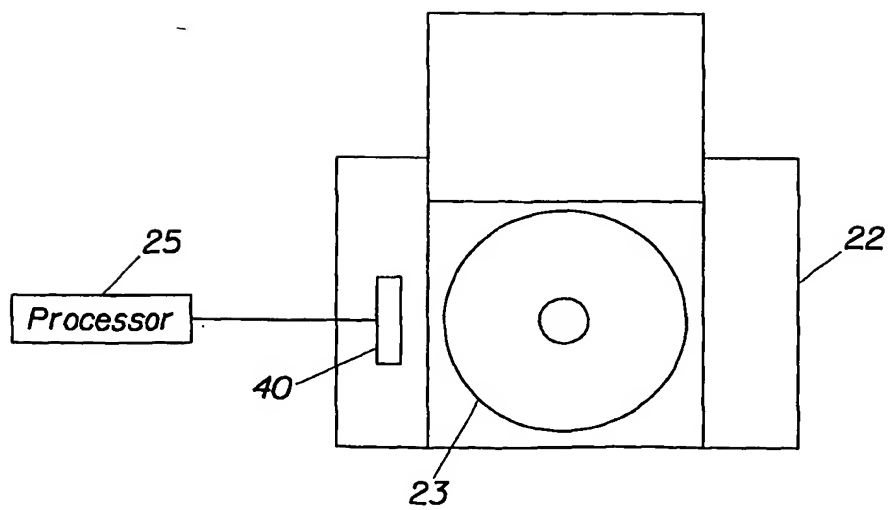


Fig. 6

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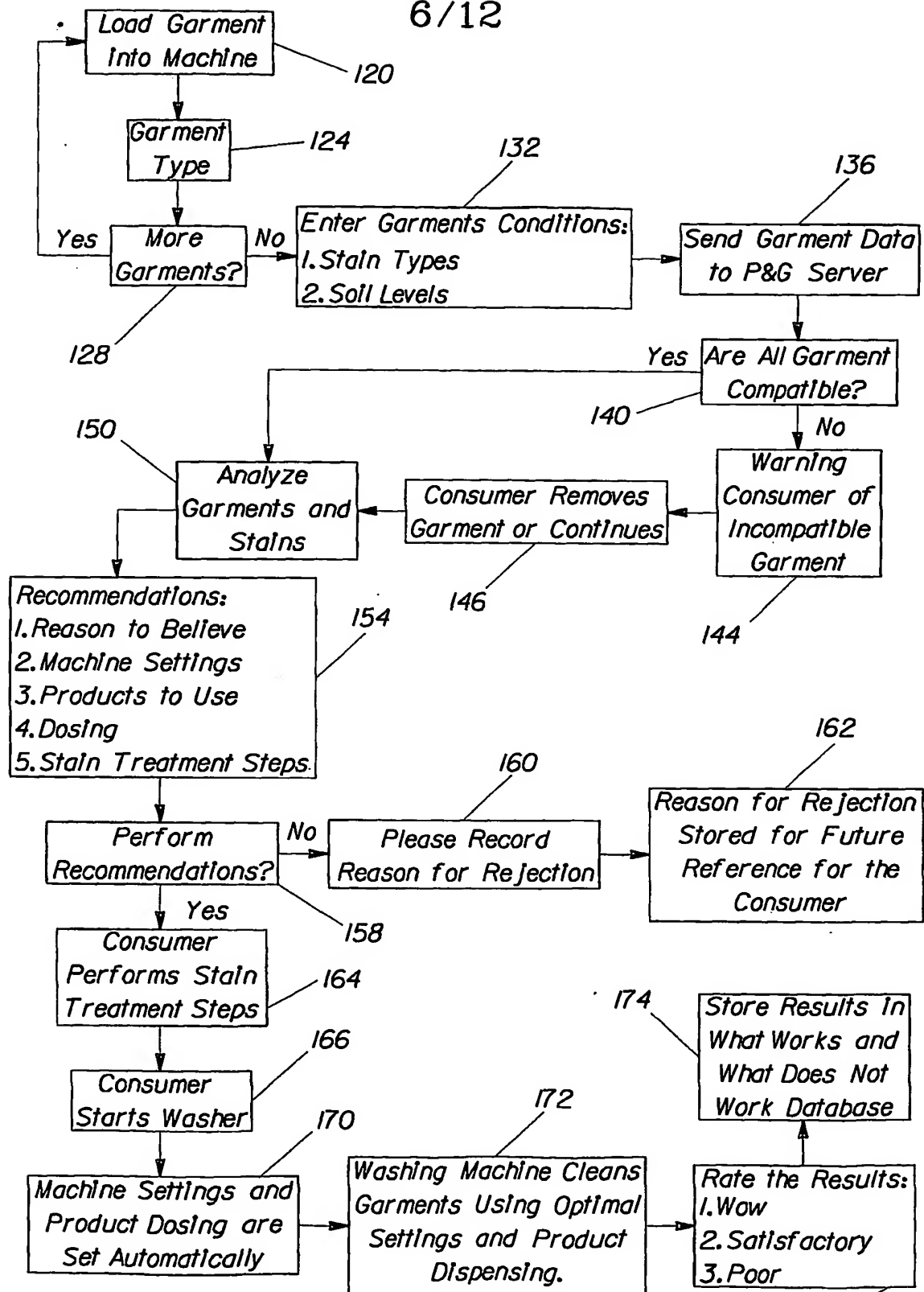
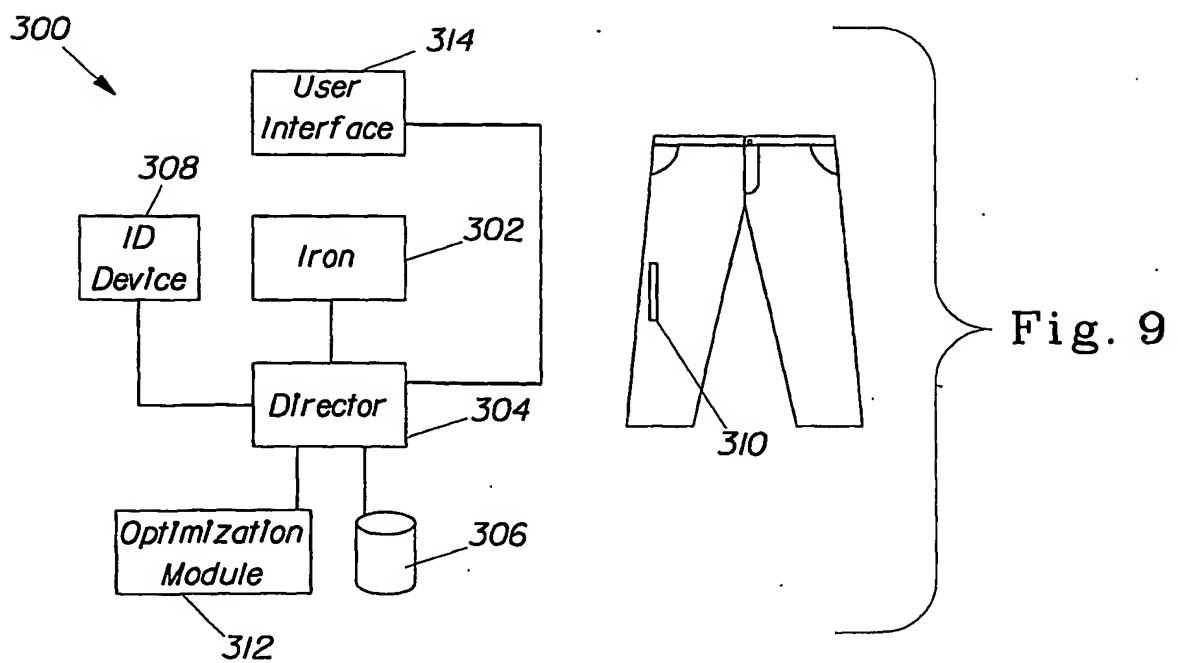
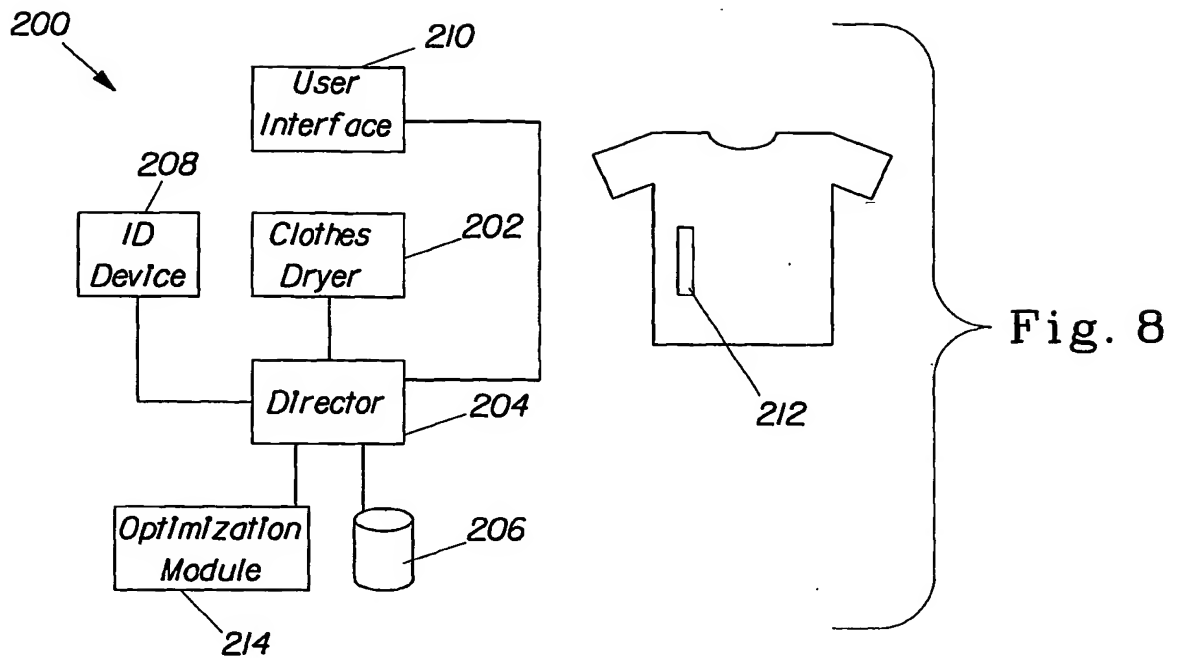


Fig. 7

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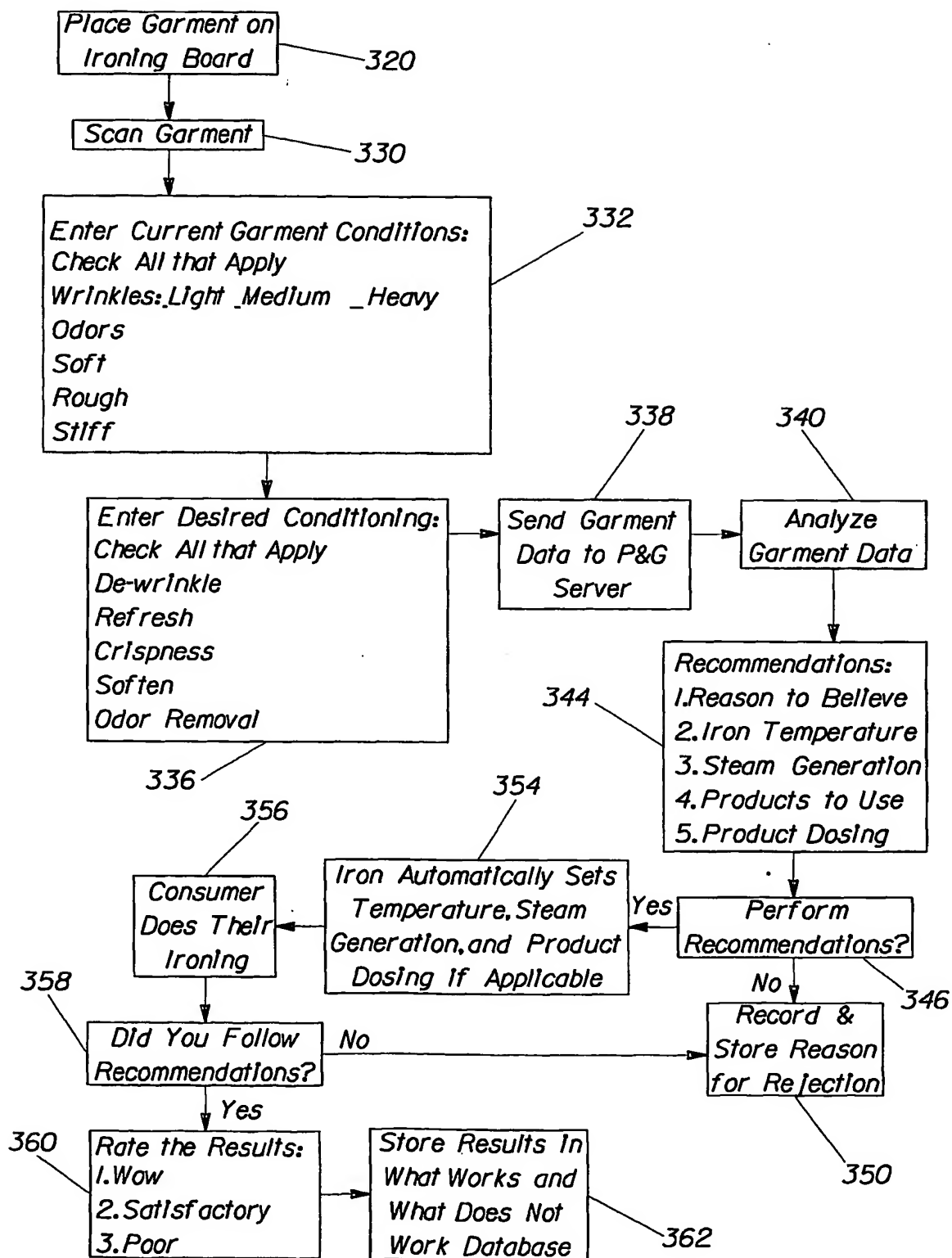
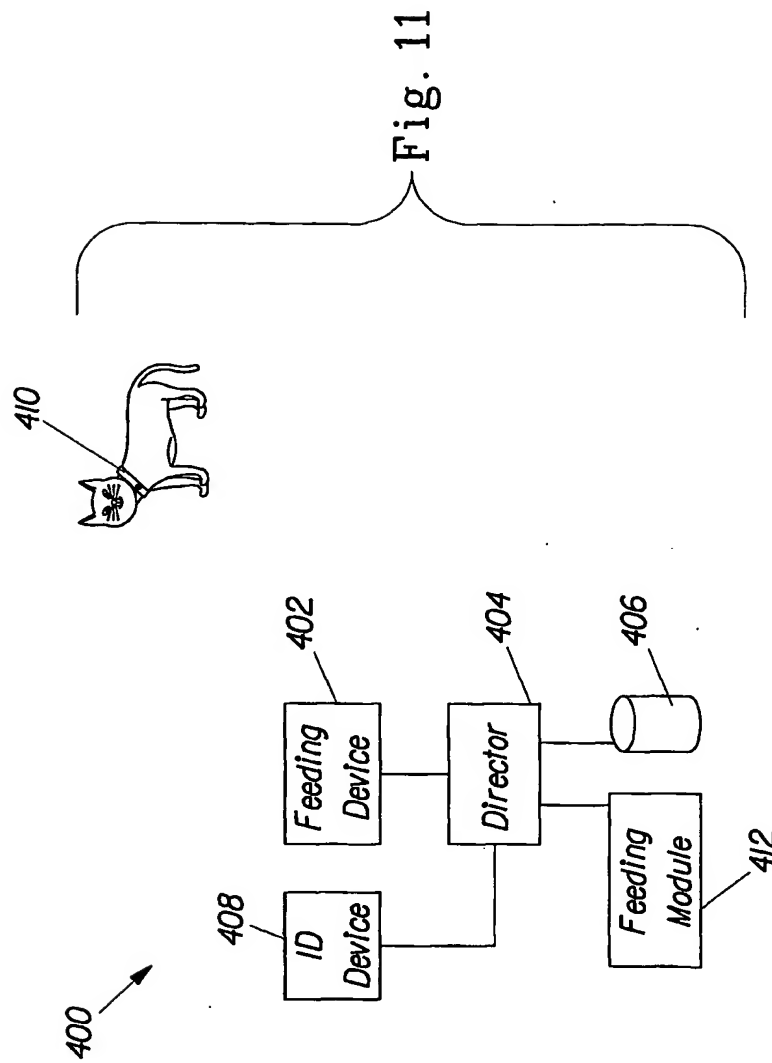


Fig. 10

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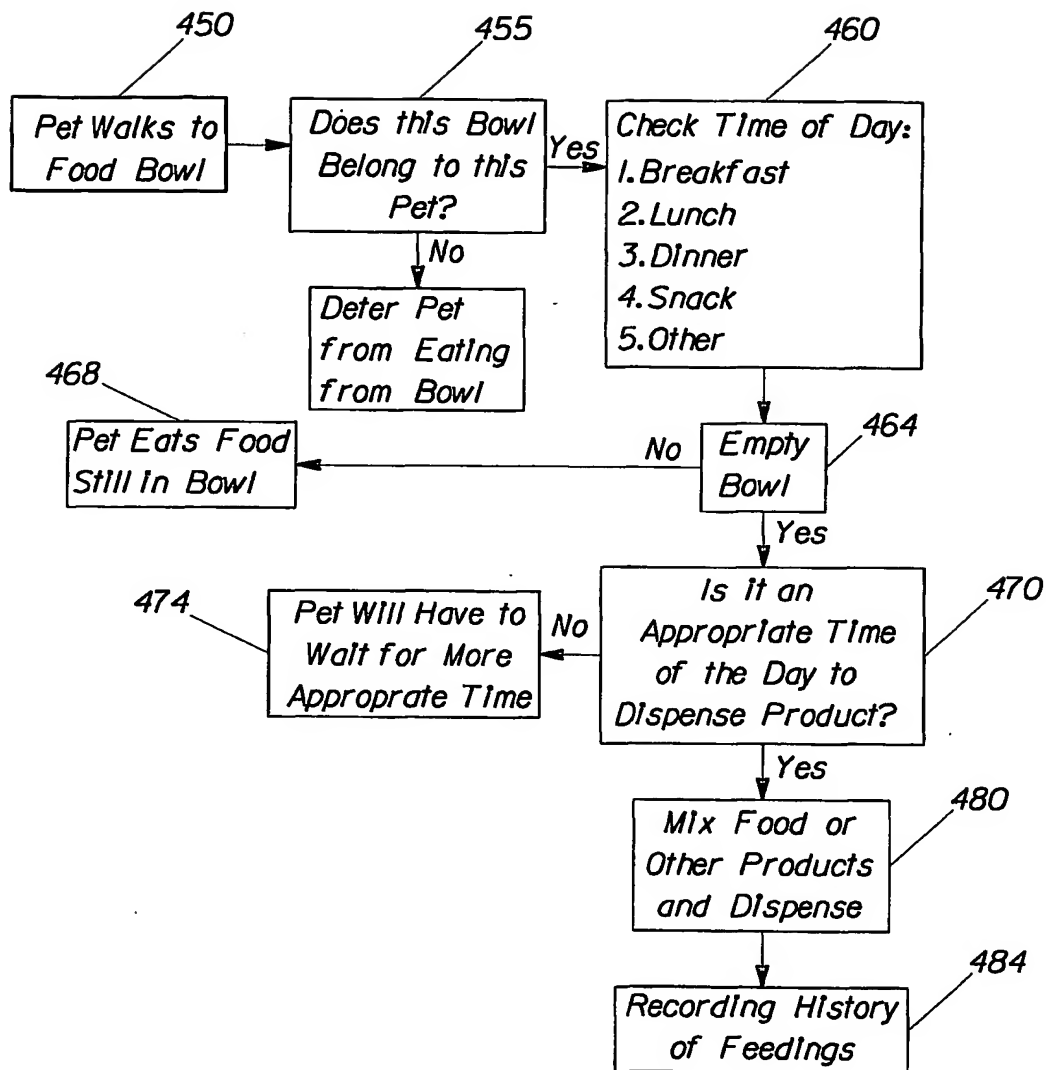
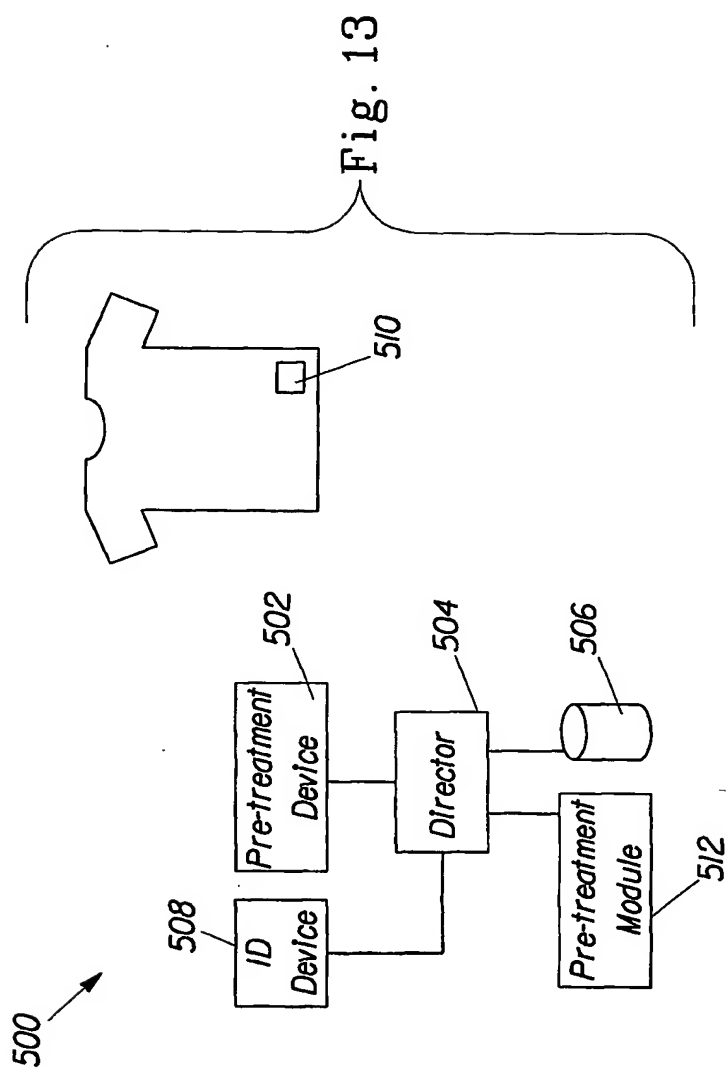


Fig. 12

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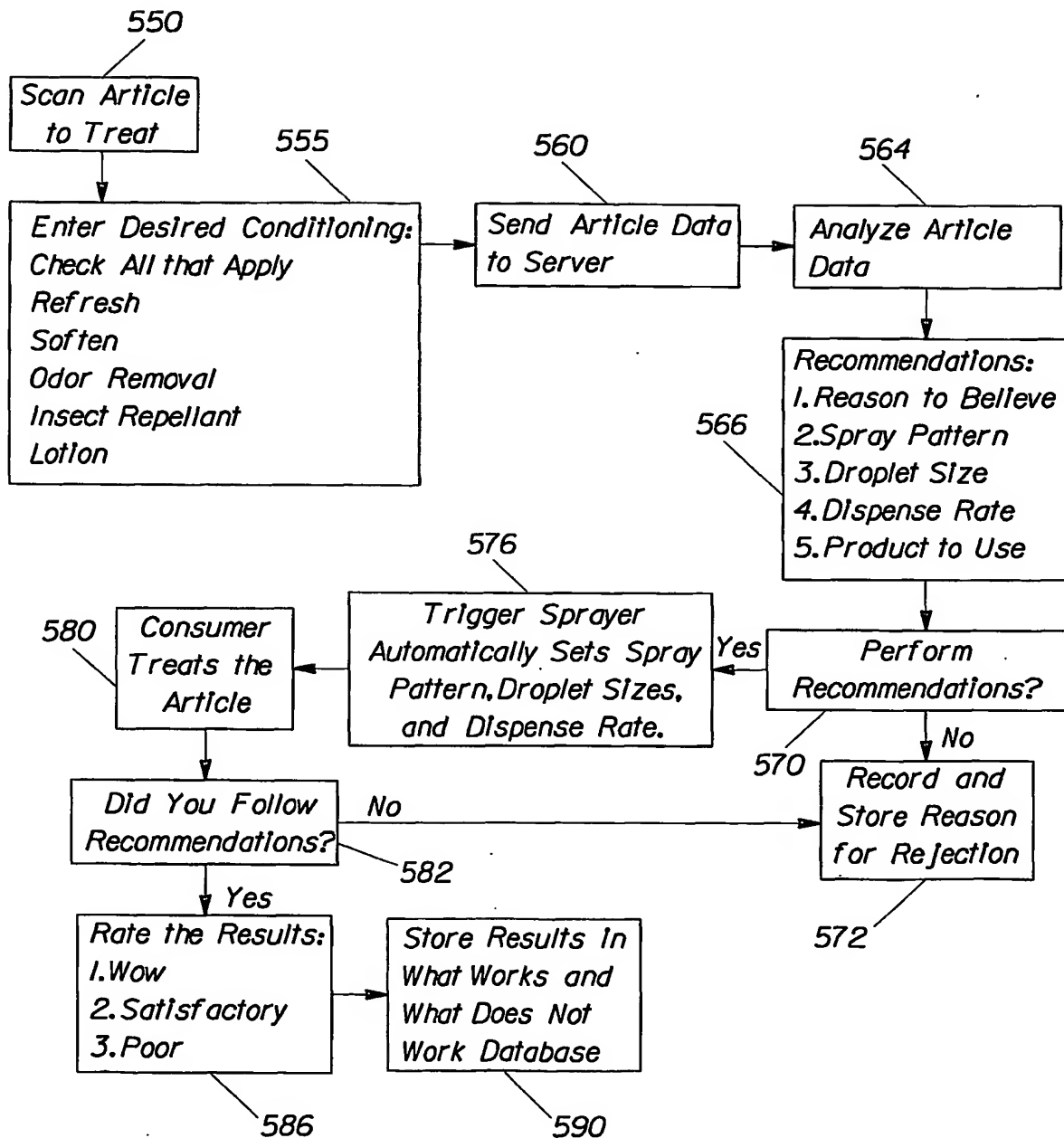


Fig. 14

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[US/US]; One Procter & Gamble Plaza, Cincinnati, OH 45202 (US).

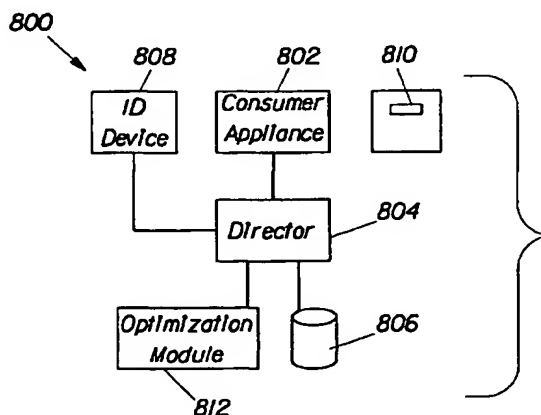
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[Continued on next page]

(54) Title: METHOD AND SYSTEM FOR OPTIMIZING PERFORMANCE OF CONSUMER APPLIANCES



(57) Abstract: A system and method for optimizing performance of a consumer appliance, including: a consumer appliance; a work piece identifier; a director in communication with the consumer appliance; a data store in communication with the director; an identification device in communication with the director; and an optimization module in communication with the director, having executable instructions for determining optimized operating conditions of the consumer appliance. One exemplary embodiment is a method of optimizing processing conditions based on environmental conditions. The method comprises the steps of providing a consumer appliance having one or more sensors in communication with a director and sensing one or more environmental conditions from the sensors. The sensors might then communicate the environmental conditions to the director and to an optimization module in communication with the director. Finally, the optimization module might be configured to optimize the processing conditions based on the environmental conditions.

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**(88) Date of publication of the international search report:**  
25 April 2002

# II INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/18893

## A. CLASSIFICATION OF SUBJECT MATTER

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According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 D06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 438 507 A (GOLDSTAR CO. LTD.) 1 August 1995 (1995-08-01) the whole document ---	1-12
X	US 5 603 233 A (HONEYWELL INC.) 18 February 1997 (1997-02-18) the whole document ---	1-3, 5, 6
X	EP 0 392 196 A (BOSCH-SIEMENS HAUSGERÄTE GMBH) 17 October 1990 (1990-10-17) claims; figures ---	16-18
X	EP 0 619 395 A (GOLDSTAR CO. LTD.) 12 October 1994 (1994-10-12)	1, 4, 7, 12-15, 19, 21, 22, 25, 26
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X	<p>DE 198 10 907 A (F. ROELL)  16 September 1999 (1999-09-16)</p> <p>the whole document -----</p>	<p>1,4,7,  12-15,  19-22,26</p>

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/18893

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5438507	A	01-08-1995	KR 9511609 B1 CN 1097478 A ,B JP 2951517 B2 JP 7008676 A	06-10-1995 18-01-1995 20-09-1999 13-01-1995
US 5603233	A	18-02-1997	NONE	
EP 392196	A	17-10-1990	DE 3911862 A1 AT 101214 T DD 296128 A5 DE 59004461 D1 EP 0392196 A1 ES 2048878 T3	18-10-1990 15-02-1994 21-11-1991 17-03-1994 17-10-1990 01-04-1994
EP 619395	A	12-10-1994	KR 9511598 B1 DE 69419446 D1 DE 69419446 T2 DK 619395 T3 EP 0619395 A1 JP 6304379 A US 5388299 A	06-10-1995 19-08-1999 20-01-2000 29-11-1999 12-10-1994 01-11-1994 14-02-1995
DE 19810907	A	16-09-1999	DE 19810907 A1	16-09-1999